

REMARKS

Applicants have now had an opportunity to carefully consider the Examiner's comments set forth in the Office Action of December 15, 2003. Reexamination and reconsideration are respectfully requested.

The Office Action

Acknowledgment was made that the drawings filed on October 10, 2001 were accepted by the Examiner.

Claims 1-2 were presented for examination.

Claim 1 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent number 6,144,120 issued to Doi et al. (Doi) in view of U.S. Patent number 6,093,984 issued to Shiga et al. (Shiga).

Claim 2 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Doi et al. in view of Shiga et al., and further in view of U.S. Patent number 6,286,804 B1 issued to Avinger et al. (Avinger).

The Art Rejections

The Present Application:

For purposes of a brief review, the present application is directed to providing a linear type actuator in which a rotor unit is manufactured by insert molding. A nut serves as a motion converting means, which plays an important part in a linear type actuator. The linear actuator further comprises a field magnet and a magnet stopper. Such a design reduces the material cost and improves productivity, thereby achieving a cost reduction.

The Present Application Distinguishes over the References:

In rejecting independent claim 1 as being unpatentable over Doi in view of Shiga, applicants respectfully submit that combining elements of the cited references does not arrive at the claimed invention. In particular, claim 1 of the present application, as amended, includes a conversion means arranged on an inner portion of the resin portion of the rotor, as further described on page 5, line 20 to page 6, line 6. Claim 1 further includes a limitation wherein the conversion means is integrally constituted with the rotor by insert molding, and that the conversion means is made of a material having a small friction coefficient and sufficient abrasion resistance. Doi, on the other hand, in column 5, lines 47-62, simply describes a through hole in the rotor having a screw thread formed therein, and does not

suggest insert molding a separate conversion means into an inner peripheral portion of the rotor.

Further, the rotor having a screw thread formed therein as taught by Doi does not permit the possibility of forming the conversion means from a material different from that of the rotor. The female screw is formed simultaneously with the molding process of the rotor 4, and along the whole length thereof in its longitudinal direction, as clearly seen in Fig. 1A. The female screw portion is, consequently, the same resin material of which the rotor is molded from.

Shiga discloses a three-phase brushless DC motor in which a rotor is disposed outside a stator (col. 4, lines 31-35). The stator core has teeth 14 arranged in its peripheral direction as shown in Fig. 3. Further, the rotor 28 disposed outside the stator has magnets 38 mounted on an inner circumferential face of the rotor yoke as shown in Figs. 1 and 2 and described in col. 5, lines 31-34. Thus, the motor of Shiga cannot be properly combined with the stepping motor of Doi which has a rotor provided interior to the magnetic field of the stator, col. 5, lines 15-25. Even if the Shiga motor were to be turned inside-out to be combined with the stepping motor of Doi, the combination would not suggest the features of the linear actuator of the present application as set forth in claim 1, particularly since Shiga does not disclose any conversion means.

In addition, the problems addressed by the present application, and by the limitations of independent claim 1, as amended, are clearly defined on page 2, lines 3-19 but are not taught or suggested by the cited references. As a result of the aforementioned limitations of claim 1, an appropriate selection of materials for the resin portion of the rotor and the conversion means can be realized. This permits a cost reduction in the unit because the conversion means usually requires a more expensive material than is required for the resin portion of the motor. The rotor as taught by Doi, or by a combination of Doi and Shiga, does not allow for the same flexibility in the selection of materials, thereby further illuminating the distinguishing features of claim 1, as amended, of the present application.

With reference now to the Examiner's rejection of claim 2, Avinger discloses a molded pentagonal tree stand. Avinger further teaches rounding corners 22 between adjacent side walls in order to facilitate molding and reduce stress concentrations in the molded product (col. 2, lines 37-40). On the other hand, the rounded corners as set forth in claim 2 of the present application serve to reduce a stress of a different kind. The rounded corners of the conversion means serve to reduce stress exerted on the insert molding resin of the rotor as disclosed on page 7, lines 7-9 and page 6, lines 4-6. Thus, the rounded corners as taught by

Avinger do not teach or suggest rounding the corners of the conversion means to reduce stress on the insert molding resin of the rotor. Therefore, claim 2 also defines over the asserted 3 way combination.

For the foregoing reasons, it is respectfully submitted that independent claim 1, as amended, and its dependent claims, claim 2 and new claims 4-7, patentably distinguish over the cited art.

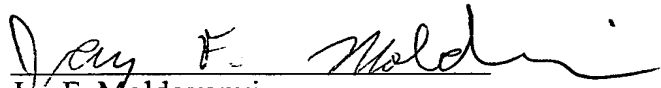
Newly added independent claim 8 includes limitations similar to those of independent claim 1, as amended, including the limitation that the conversion means comprises a second resin material, different than the resin material of the rotor. Thus newly added claim 8 should also distinguish over the cited references, just as does claim 1.

It is therefore respectfully submitted that new independent claim 8, and claims 9-10, depending therefrom, also patentably distinguish over the cited art.

CONCLUSION

For the reasons detailed above, it is respectfully submitted that claims 1, 2, and 4-10 of the present application are now in condition for allowance. An early notice to that effect is earnestly solicited.

Respectfully submitted,
FAY, SHARPE, FAGAN,
MINNICH & McKEE, LLP


Jay F. Moldovanyi
Reg. No. 29,678
1100 Superior Avenue, 7th Floor
Cleveland, Ohio 44114-2518
(216) 861-5582